

Application No.: 10/654,369
Attorney Docket No.: LSP-50
Amendment Dated: July 21, 2005
Reply for Office Action Dated: 17 May 2005

REMARKS

Claims 1-29 are pending in the application. Claims 15-20 have been previously withdrawn from consideration (now cancelled herein).

Claims 1 and 21-24 have been amended herein. The claim amendments add no new matter and are fully supported by the original disclosure, e.g., Page 5, lines 1-5 and 13-19; Page 8, lines 14-18; Page 13, lines 1-4; Page 14, lines 18-22; Page 15, lines 9-15; Page 20, lines 4-19.

Claims 30-33 have been newly added herein. The newly added claims introduce no new matter and are fully supported by the original disclosure, e.g., Claims 3, 5, 6, and 13.

Claim 1 has been amended to recite that the liquid material absorbs energy directed to the energy-absorbing overlay ("said pulse of coherent energy being absorbed at least in part by said liquid material"). Claim 21 has been similarly amended. This feature differs from the cited art, where the laser energy is absorbed by a solid energy-absorbing overlay (e.g., overlay material made to dry or originally solid). Even when black paint is used as the material for the energy-absorbing overlay, the prior art teaches that the black paint is dried (i.e., made solid) before the workpiece is irradiated with laser energy. (Page 4, lines 3-7; Page 7, lines 23-25.) Accordingly, the prior art does not disclose a treatment process involving laser irradiation of the workpiece and subsequent absorption of the laser energy by a liquid energy-absorbing overlay.

Separately, the claims also distinguish over the cited art because the cited art does not disclose, inter alia, the step of applying an energy-absorbing overlay to a portion of the workpiece surface, where the energy-absorbing overlay has a liquid material composition that is resistant to drying. For example, the prior art use of black paint does not satisfy the energy-absorbing overlay of the claims because the black paint is intentionally made to dry, i.e., the

Application No.: 10/654,369

Attorney Docket No.: LSP-50

~~Amendment Dated: July 21, 2005~~

Reply for Office Action Dated: 17 May 2005

black paint is not resistant to drying but has an affinity for drying. Additionally, the prior art use of tape does not satisfy the energy-absorbing overlay of the claims because the tape is not a liquid material.

Claim 23 stands rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 23 has been amended herein. No new matter is added with the claim amendment. The claim amendment is fully supported by the original disclosure, e.g., Page 8, lines 17-21; Page 15, line 9 to Page 16, line 2.

Referring to the subject matter of Claim 23 (as amended), the pre-coating or pre-spraying step applies an initial amount of liquid material to the workpiece ("another adherent, uniformly spreading liquid material"), which later is followed by the application of an additional amount of such liquid material ("applying an energy-absorbing overlay ... composed of an adherent, uniformly spreading liquid material", Claim 21). The advantage of having an initial build-up of the liquid material is that less of it needs to be applied later on in the processing chamber or work cell. (Page 8, lines 17-21; Page 15, line 9 to Page 16, line 2.)

Accordingly, the pre-coating/pre-spraying step (Claim 23) and step of applying an energy-absorbing overlay (Claim 21) deposit separate substances (although having similar material properties, i.e., adherent, uniformly spreading, resistant to drying).

In view of the foregoing, Applicant respectfully requests that this rejection be withdrawn.

Application No.: 10/654,369
Attorney Docket No.: LSP-50
Amendment Dated: July 21, 2005
Reply for Office Action Dated: 17 May 2005

Claims 1-4, 7, 8, 14, and 21-23 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,057,003 to Dulaney et al. ("Dulaney") in view of U.S. Patent No. 6,254,703 to Sokol et al. ("Sokol").

Regarding Claim 1, for example, the rejection states that the recitation directed to the "energy-absorbing overlay being composed of a liquid material resistant to dissolution by the transparent water overlay and resistant to drying" is met as follows:

Dulaney et al. discloses a method of treating a workpiece by applying shockwaves by applying an energy absorbing material (opaque, see column 4, lines 12-19) layer that can be either graphic or carbon black with a transparent material. (Office Action, paragraph no. 5, Page 3.)

However, the opaque overlay materials of Dulaney relied upon to ostensibly meet the "energy-absorbing overlay" of the claims do not disclose a liquid material having the indicated properties: resistant to dissolution by the transparent water overlay and resistant to drying.

It appears that the basis of the rejection relies upon the Dulaney disclosure at Col. 4, lines 15-16 stating that the "opaque overlay materials include ... graphite ... carbon black", while the application indicates that one illustrative composition of the opaque overlay material may include graphite or carbon black as a dispersant. In particular, the specification reads as follows:

Useful opaque overlay materials of the present invention include an energy-absorbing dispersant and a base material. The dispersant may, for example, be graphite, carbon black, black iron oxide (Fe_2O_3), and/or mixtures of these materials. The base material for such opaque overlay materials is advantageously an oil (e.g., mineral, vegetable, petroleum-derived) which contributes to the viscosity control, adherence, and drying resistance needed by the opaque overlay material of the present invention. The mixture of the dispersant and base material is colloidal in nature, in the sense that the dispersant is too fine to be filtered readily from the base material and is resistant to settling. (Page 12, lines 15-26).

Application No.: 10/654,369
Attorney Docket No.: LSP-50
Amendment Dated: July 21, 2005
Reply for Office Action Dated: 17 May 2005

However, merely because Dulaney employs graphite or carbon black in the overlay does not make it inherent that the opaque overlay material itself is identical to the composition employed by the process of Claim 1, namely, an energy-absorbing overlay composed of a liquid material having the properties that it is (i) resistant to dissolution by the transparent water overlay; and (ii) resistant to drying. These properties are not necessarily present in the opaque overlay materials recited by Dulaney and relied upon in the rejection, merely because the opaque overlay may use graphite or carbon black. By comparison, in the invention, the composition utilized in the step of applying the energy-absorbing layer is specifically formulated to exhibit the properties of resistance to dissolution by the transparent water overlay and resistance to drying, so that the energy-absorbing overlay maintains its liquid form and results in the laser energy being absorbed by the liquid material. (Claims 4-6 set forth examples of such a composition.)

Dulaney does not disclose, inter alia, the step of applying an energy-absorbing overlay to a portion of the workpiece surface, where the energy-absorbing overlay has a liquid material composition that is resistant to drying, and the step of directing a pulse of coherent energy to the energy-absorbing overlay, where the pulse of coherent energy is absorbed at least in part by the liquid material. Specifically, the energy absorbing material of Dulaney is not resistant to drying, nor does the laser treatment of Dulaney in view of Sokol involve absorption of the laser energy by liquid material from the energy absorbing layer.

Indeed, it is believed that one skilled in the art would recognize that Dulaney teaches away from the use of such a drying-resistant liquid material composition for an energy-absorbing overlay in a laser shock process, even with an opaque overlay composed of graphite or carbon

Application No.: 10/654,369

Attorney Docket No.: LSP-50

Amendment Dated: July 21, 2005

Reply for Office Action Dated: 17 May 2005

black (as Dulaney discloses). Instead, the art teaches the use of a dried opaque overlay (i.e., not resistant to drying), when an initial liquid material is originally applied (e.g., black paint).

Nevertheless, irrespective of whether the original overlay is liquid (and made to dry) or solid, the art teaches in both cases that the opaque overlay is always in solid form when it absorbs the laser energy. In the invention, however, the laser energy is absorbed (at least in part) by the liquid material from the energy-absorbing overlay, which is made possible since the "resistant to drying" and "resistant to dissolution" properties of the liquid material (Claim 1) ensure that the energy-absorbing overlay maintains its liquid form up to the moment that irradiation and energy absorption take place.

Dulaney discloses as follows, including the citation referenced in the rejection (emphasis added):

Laser peening (sometimes referred to as laser shock processing) utilizes two overlays; a transparent overlay (usually water) and an opaque overlay (usually an oil-based or acrylic-based black paint). (Col. 1, lines 40-43.)

Where used, the opaque overlay material may be strongly absorbing to the radiation. Useful opaque overlay materials include black paint, pentaerythritol tetranitrate (PETN); bismuth, aluminum, iron, lead, cadmium, tin, zinc, graphite; and mixtures of charcoal or carbon black with various transparent materials such as mixtures of nitrocellulose and potassium perchlorate or potassium nitrate. Optionally, a layer of another solid overlay material may be attached to the layer of substantially opaque material. (Col. 4, lines 12-20.)

As presented above, Dulaney at one place teaches an opaque overlay ("oil-based or acrylic-based black paint"), which as known is dried prior to irradiation of the workpiece, hence no portion of the laser energy is absorbed by liquid material of the opaque overlay. (Page 3, lines 1-4; Page 4, lines 3-5; Page 5, lines 1-5; Page 7, lines 23-25.) At another place, Dulaney provides a listing of opaque overlay materials. However, all of these materials are in solid form

Application No.: 10/654,369
Attorney Docket No.: LSP-50
Amendment Dated: July 21, 2005
Reply for Office Action Dated: 17 May 2005

for laser processing (e.g., made to dry or solid form originally), as evidenced in the statement that "another solid overlay material may be attached to the layer of substantially opaque material", which implies that the underlying opaque material itself is solid.

Referring to Claim 1, for example, and in view of the foregoing, it is believed that Dulaney does not meet the claim recitations pertaining to a liquid material composition for the energy-absorbing layer, namely, the steps of "applying an energy-absorbing overlay to a portion of a surface of the workpiece, said energy-absorbing overlay being composed of a liquid material resistant to dissolution by the transparent water overlay and resistant to drying" and "directing a pulse of coherent energy to said energy-absorbing overlay, said pulse of coherent energy being absorbed at least in part by said liquid material". (Emphasis added.)

Regarding base Claim 21, Applicant believes that Dulaney is likewise deficient for reasons similar to those concerning Claim 1.

Applicant submits that Sokol does not overcome or otherwise cure the deficiencies of Dulaney.

In view of the foregoing discussion, Applicant submits that Claims 1-4, 7, 8, 14, and 21-23 are patentable over Dulaney in view of Sokol, and respectfully requests that this rejection be withdrawn.

Claims 9-11 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Dulaney in view of Sokol and further in view of U.S. Patent No. 6,064,035 to Toller et al.

In view of the foregoing discussion concerning the rejection of Claim 1, Applicant submits that Claims 9-11 are patentable over the cited art as depending from patentably

Application No.: 10/654,369

Attorney Docket No.: LSP-50

Amendment Dated: July 21, 2005

Reply for Office Action Dated: 17 May 2005

distinguishable base Claim 1. Accordingly, Applicant respectfully requests that this rejection be withdrawn.

Claim 12 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Dulaney in view of Sokol and Toller et al. and further in view of U.S. Patent No. 6,548,782 to Dykes et al.

In view of the foregoing discussion concerning the rejection of Claim 1, Applicant submits that Claim 12 is patentable over the cited art as depending from patentably distinguishable base Claim 1. Accordingly, Applicant respectfully requests that this rejection be withdrawn.

Claim 24 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Dulaney in view of Sokol and further in view of Dykes et al.

In view of the foregoing discussion concerning the rejection of Claim 21, Applicant submits that Claim 24 is patentable over the cited art as depending from patentably distinguishable base Claim 21. Accordingly, Applicant respectfully requests that this rejection be withdrawn.

Claim 25 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Dulaney in view of Sokol and further in view of U.S. Patent No. 6,500,269 to Risbeck et al.

In view of the foregoing discussion concerning the rejection of Claim 21, Applicant submits that Claim 25 is patentable over the cited art as depending from patentably distinguishable base Claim 21. Accordingly, Applicant respectfully requests that this rejection be withdrawn.

Claim 26 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Dulaney in view of Sokol and Risbeck et al. and further in view of U.S. Patent No. 5,741,559 to Dulaney.

Application No.: 10/654,369
Attorney Docket No.: LSP-50
Amendment Dated: July 21, 2005
Reply for Office Action Dated: 17 May 2005

In view of the foregoing discussion concerning the rejection of Claim 21, Applicant submits that Claim 26 is patentable over the cited art as depending from patentably distinguishable base Claim 21. Accordingly, Applicant respectfully requests that this rejection be withdrawn.

Claims 27 and 28 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Dulaney in view of Sokol and further in view of U.S. Patent No. 6,292,584 to Dulaney et al.

In view of the foregoing discussion concerning the rejection of Claim 21, Applicant submits that Claims 27 and 28 are patentable over the cited art as depending from patentably distinguishable base Claim 21. Accordingly, Applicant respectfully requests that this rejection be withdrawn.

The Examiner has objected to Claims 5, 6, and 13 as being dependent upon a rejected base claim, but has indicated that these claims would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

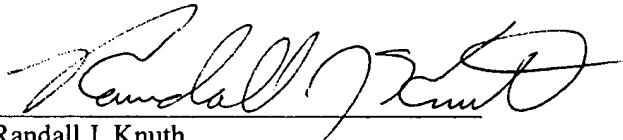
Applicant respectfully submits that Claims 5, 6, and 13 are patentable as depending from patentably distinguishable base Claim 1, and requests that this objection be withdrawn.

Applicant believes that the application is in condition for allowance and respectfully requests favorable action in accordance therewith.

Application No.: 10/654,369
Attorney Docket No.: LSP-50
Amendment Dated: July 21, 2005
Reply for Office Action Dated: 17 May 2005

If the Examiner has any questions or comments that would advance prosecution of this case, the Examiner is invited to call the undersigned at 260/484-4526.

Respectfully Submitted,


Randall J. Knuth
Registration No. 34,644

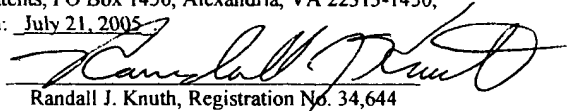
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Enclosures: Amendments to the Claims
(8 Sheets)
Explanatory Cover Sheet - Page 1
Return Postcard

Customer No.: 022855
RANDALL J. KNUTH, P.C.
4921 DeSoto Drive
Fort Wayne, IN 46815
Telephone (260) 484-4526
Facsimile (260) 484-0185
Email:

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the U.S. Postal Service as first class mail in an envelope addressed to: Commissioner for Patents, PO Box 1450, Alexandria, VA 22313-1450, on: July 21, 2005


Randall J. Knuth, Registration No. 34,644

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Date